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Influence of RDF in Conjunction with Water Soluble Fertilizers on Growth, Yield and Economics of Cauliflower (*Brassica oleracea* var *botrytis*) Production

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The experiment was conducted during rabi season of the year 2019-20 at MHREC, University of Horticulture Sciences, College of Horticulture, Bagalkot. The experiment was laid out in a Randomized Complete Block Design. There were 13 treatments viz. 33% RDF + 2.5% foliar spray (T_1), 33% RDF + 5.0% foliar spray (T_2), 33% RDF + 7.5% foliar spray (T_3), 33% RDF alone (T_4), 50% RDF + 2.5% foliar spray (T_5), 50% RDF + 5.0% foliar spray (T_6), 50% RDF + 7.5% foliar spray (T_7), 50% RDF alone (T_8), 66% RDF + 2.5% foliar spray (T_9), 66% RDF + 5.0% foliar spray (T_{10}), 66% RDF + 7.5% foliar spray (T_{11}), 66% RDF alone (T_{12}) and 100% RDF alone (T_{13}) with three replications. In the study maximum plant height, number of leaves per plant, length and breadth of leaves and minimum days to harvest were found significantly in the treatment T_{10} compared to others. Similarly, yield and quality parameters were also best with the treatment T_{10} impacting highest B: C ratio of 5.89. The study revealed that combination of 66% RDF and 5.0% foliar spray was best for the cv. Mahima-80 and other cultivars.

Introduction

Cauliflower (*Brassica oleracea var. botrytis*) is one of the most popular vegetable among the cole crops in India, widely grown in tropical and temperate regions of the country. It belongs to Brassicaceae family (Chromosome no. 2n=2x=18). Two distinct cauliflower classes are commonly grown in India viz., Indian or tropical varieties (originating in India) and the annual temperate or European type, also known as the type of Erfurt or Snowball.

It is grown throughout the world, China ranks first followed by India, USA, Spain and Mexico. India has an area of 0.43 million hectares and production of 8.57 million tonnes which keeps them second in the world. In India it is grown mainly in states like West Bengal, Bihar, Madhya Pradesh, Haryana and Odisha. West Bengal takes first in both area

and production of 74.20 (‘000 ha) and 1899.58 (‘000 MT), respectively. Jammu and Kashmir stands first in productivity. Of the 10.29 million hectares of vegetable land, 2.27 percent is occupied by cauliflower. It is exported to different countries mainly to neighboring country Nepal, Russia, Saudi Arabia, Maldives and Singapore (Pavan Kumar *et al.,* 2018). It is propagated through seed and healthy seedling is necessary for getting a quality crop.

Of the major elements, nitrogen which is insufficient in most of the Indian soils plays an appreciably important role in Brassica crops (Kumar, 1986). Cauliflower is a heavy feeder of nutrients; hence cauliflower production needs efficient nutrient management for achieving maximum yield. Cauliflower nutrient management also affects the nutritive, marketing and keeping quality of the curd and it demands for efficient management of nutrient supply system. Nitrogen is the most energy intensive element and various losses in the form of denitrification, volatilization, leaching and fixation are more often with this than any other nutrient element. About 50% of the applied nitrogen to the soil remains unavailable to a crop because of the losses, resulting in physiological disorder like buttoning which occurs due to deficiency of nitrogen. Foliar nutrition with water soluble fertilizers can eliminate these problems. Foliar nutrients usually penetrate the cuticle of the leaf or stomata, enter the cells rapidly and fulfill the nutrient demand of the growing plant and thus ameliorate nutrient deficiencies rapidly. If dose of nitrogen could be reduced by foliar application, it would curtail the cost of cultivation significantly and would be an economically viable technology. However, the wastage of nutrients can be reduced by foliar applications of dilute solutions of nutrients to supplement the basal applications.

Materials and Methods

The experiment was conducted in medium red sandy loam soil with pH 7.00 at Main Horticultural Research and Extension Centre (MHREC), University of Horticultural Sciences, Bagalkot, Karnataka. It is situated in Northern part of Karnataka state with 16.1635 ^{o}N latitude and 75.6172^{o}E longitude at 563 meters above sea level. The mean rainfall was about 561mm with maximum temperature of 38.9^{o}C and minimum temperature of 19.05^{o}C. The relative humidity 80.16 per cent and 40.27 per cent, respectively in the morning and evening were observed during the crop growth period. The soil texture of the experimental field was red sandy loam. Initial soil pH, N P and K was 7.43, 65 kg/ha, 29.77 kg/ha and 75kg/ha respectively.

The experiment was laid out in RCBD design with 45 cm x 30 cm and variety used was Mahima-80. Prior to transplanting basal application of farm yard manure at the rate of 25 tonnes per hectare was applied at the time of soil preparation. The recommended dose of nutrients of 150 kg/ha N, 100 kg/ha P_2O_5 and 125 kg/ha K_20 were applied with half basal dose of N, complete dose of phosphorus and potassium before transplanting of the seedlings. The left over 50 per cent of nitrogen were applied at two split doses, first 25 days after transplanting and another 45 days after transplanting. Foliar application was given thrice i.e., 20 days after transplanting 40 days after transplanting and 60 days after transplanting. For soil application Urea, SSP and MOP was used where as for foliar application Urea, 19:19:19 and SOP was used. The data were recorded from three randomly selected plants which was tagged and labeled in each treatment and replication plot. For growth parameters, the data was recorded at 45th day and final day of the harvest respectively for each treatment.

The mean of those three plants were calculated and used for analysis.

Statistical analysis

Data were systematically arranged on the basis of various observed parameters. Microsoft Excel and Genstat discovery (developed at VSNi, UK) software were used for the analysis of variance and other data analysis. The treatments were tested at 5 percent level of significance.

Results and Discussion

Growth parameters

Plant height (cm)

Plant height ranged from 41.89 cm to 52.22 cm with the mean of 46.46 cm at 45 days after transplanting. The supreme plant height was in T_{11} - 66% RDF + 7.5% foliar spray (52.22 cm) followed by T_{13} (49.67 cm), T_{12} (49.33 cm), T_{10} (48.89 cm) and T_8 (48.44 cm) which were on par with each other. However, minimal plant height was observed in treatment T_2 -33% RDF + 5.0% foliar spray (41.89 cm).

The results were found to be substantially contrasting from each other in the final stage. The range of treatment variation was 48.67 cm to 60 cm with the mean of 53.10 cm. The maximum height was attained in the treatment T_{10}- 66% RDF + 5.0 % foliar spray (60.00 cm) followed by T_9 (57.33 cm), T_{11} (55.22 cm), T_6 (54.33 cm) and T_5 (54.22 cm). These all treatments were on par with each other. The minimum plant height was found in treatment T_4 (33% RDF alone: 48.67 cm).

Number of leaves

Number of leaves varied in between 13.33 to 15.44 with the average of 13.86 at initial stage i.e., 45 days after transplanting. More number of leaves was recorded at T_{12} (15.44) followed by T_{13} (15.41), T_4 (14.78) and T_{11} (14.22) which were on par with each other. Meanwhile less number of leaves were found in the treatment T_1 (33% RDF + 2.5% foliar spray: 13.33) and it was statistically on par with T_6 (50% RDF + 5.0% foliar spray: 13.56) followed by T_7 (50% RDF + 7.5% foliar spray: 13.67), T_8 (50% RDF alone: 13.78), respectively.

At harvesting stage, the findings were significantly different. The range of treatment variation was 14.78 to 18.22 with the mean of 15.93. Maximum number of leaves were found in the treatment T_{10}- 66% RDF + 5.0 % foliar spray (18.22) followed by T_9 (17.56), T_6 (16.78) and T_{12} (16.56). These all treatments were on par with each other. The least number of leaves was found in the treatment T_1 (33% RDF + 2.5% foliar spray: 14.78) followed by T_2 (33% RDF + 5.0% foliar spray: 15.33) at final growth stage.

Length (cm)

The results were considerably disparate among the treatments for length at 45 days after transplanting of initial growth stages. The values of length of the leaves ranged from 38.78 cm to 49.89 cm with a mean of 45.52 cm. Maximum length was obtained in the treatment T_{10} (66% RDF + 5.0% foliar spray: 49.89 cm) which was statistically on par with the treatment T_9 (49.67 cm), T_5 (48.56 cm), T_8 (48.33) and T_{11} (48.11 cm) respectively.

With regard to final stage, the leaf length varied from 40.89 cm to 53.33 cm and among the treatments, maximum leaf plant size length was recorded in the treatment T_{10} (66% RDF + 5.0% foliar spray: 53.33 cm) followed by T_5 (50.89 cm), T_9 (50.11 cm), T_8 (49.78 cm) and T_{12} (48.56 cm) respectively. These

all treatments were significant to each other. Minimum leaf length was observed in treatment T_1 (33% RDF + 2.5% foliar spray: 40.89 cm).

Leaf breadth

The results were considerably different among the treatments for breadth at 45 days after transplanting of initial growth stages. The values of breadth of the leaves ranged from 18.44 cm to 22.33 cm with a mean of 20.75 cm. Maximum breadth was noted in the treatment T_{12} (66% RDF alone: 22.33 cm) which was statistically on par with the treatment T_9 (22.11 cm), T_8 (21.89 cm), T_{11} (21.78 cm) and T_{10} (21.44 cm) respectively.

With regard to final stage, the leaf breadth ranges from 18.89 cm to 23.89 cm and among the treatments, maximum plant leaf breadth was obtained in the treatment T_{10} (66% RDF + 5.0% foliar spray: 23.89 cm) followed by T_9 (23.33cm), T_{12} (23.12 cm), T_9 (23.10 cm) and T_{11} (22.22 cm) respectively. These all treatments were significant to each other. Lowest leaf length was found in treatment T_2 (33% RDF + 5.0% foliar spray: 18.89 cm).

Number of days to harvest

The data on number of days to maturity varied in between 65.33 to 76.67 days as presented in Table 1. The lowest days to maturity (65.33 days) recorded in T_{10} (66% RDF + 5.0% foliar spray), which was considerably superior over other treatments and statistically on par with T_9 (69.33 days), T_{11} (67.33 days) and T_{12} (68 days), whereas maximum days to maturity was recorded in T_4 (33% RDF alone: 76.67 days).

Yield parameters

The statistics on yield parameters presented in the Table 2 indicated significant differences in yield parameters amongst the treatments.

Curd diameter (cm)

The effect of application of different fertilizers on curd diameter is presented in Table 2. The results were ranging from 13.44 cm to 17.11cm with a average value of 14.70 cm. The data noted with the biggest curd (17.11cm) was in treatment T_{10} (66% RDF + 5.0% foliar spray) which was statistically on par with T_{12} (66% RDF alone: 16.11 cm) and T_9 (66% RDF + 2.5% foliar spray: 15.88 cm).T (14.89 cm). The smallest curd size was obtained in treatment T_1 (33% RDF + 2.5% foliar spray: 13.44 cm) and T_3 (33%RDF + 7.5 foliar spray: 13.44 cm).

Fresh weight of cauliflower (kg)

The data varied from 0.74 kg to 1.29 kg with a mean of 0.98 kg. The inflated fresh weight (1.29 kg) of cauliflower production was observed in the treatment T_{10} (66% RDF + 5.0% foliar spray) which were superior among all other treatments. The next best treatment was T_9 (1.21 kg). The minimum fresh weight was observed in the treatment T_4 (0.74 kg) except T_8 (0.84 kg), T_2 (0.84 kg), T_3 (0.86 kg), T_1 (0.88 kg), and T_6 (0.88 kg) was at par with each other.

Average weight of curd (kg)

The data illustrated in the Table 2 indicates considerably poles apart in the average weight of curd (kg) amongst the different combination of RDF and WSF. The range of average weight of cauliflower curd was from 0.44 kg to 0.92 kg with mean of 0.71 kg.

Treatment T_{10} (66% RDF + 5.0% foliar spray: 0.92 kg) which was at par excellence amidst all other treatments except T_9 (0.86 kg) which was statistically at par. The other superior treatment was T_{12} (0.84 kg). The minimum

average weight of curd was observed in the treatment T_4 (0.44 kg) followed by T_1 (0.57 kg), T_3 (0.59 kg), T_2 (0.62 kg), T_5 (0.63 kg), T_8 (0.64 kg) and T_6 (0.65 kg) was at par with each other.

Curd yield per plot (kg)

The data pertaining to curd yield per plot was found significant each other. The highest curd yield per plot (33.62 kg) was recorded in T_{10} (66% RDF + 5.0% foliar spray), which was considerably superior over the other treatments succeeded by T_9 (32.69 kg) which was statistically on par. T_{12} (31.70 kg) was next best treatment. The lower yield per plot was found in the T_4 (17.77 kg) followed by T_1 (20.85 kg).

Total curd yield (t/ha)

The results were found contrasting amidst the treatments with respect to total curd yield. The range of curd yield was between 26.44 to 50.03 t/ha with a average value of 39.22 t/ha.

The maximum total curd yield (t/ha) was obtained in the treatment T_{10} (66% RDF + 5.0% foliar spray: 50.03 t/ha) followed by T_9 (48.64 t/ha) and T_{12} (47.17 t/ha) respectively.

The treatment involving 33% RDF alone (T_4) recorded with the lowest yield (26.44 t/ha) which was followed by T_1 (31.02 t/ha) and T_2 (33.52 t/ha).

Marketable curd yield (t/ha)

The marketable curd yield ranged from 24.23 t/ha to 48.68 t/ha with an average value of 37.51 t/ha. The data recorded with the highest curd yield (48.68 t/ha) was in treatment T_{10} (66% RDF + 5.0% foliar spray) which was on par with T_9 (47.07 t/ha) and T_{12} (45.92), which were statistically on par in between. The lowest marketable curd yield was observed in treatment T_4 (33% RDF alone: 24.23 t/ha) followed by T_1 (29.28 t/ha).

Economic analysis

Cost of cultivation

Costs are overviewed from different perspective for different purpose. Cost of cultivation of cauliflower production was worked out on the basis of operational cost, fixed cost and several cost concepts.

The details are illustrated in the Table 3 and revealed total cost cultivation ranged from Rs. 74,910.07 per hectare (lowest) to Rs. 84,879 per hectare (highest) which was accounted from the fertilizer treatment 33% RDF alone (T_4) and 100% RDF (T_{13}) respectively.

Gross return

The particular details of gross return are shown in the table 3 and revealed gross return ranged from Rs. 2,90,840 per hectare (lowest) to Rs. 5,50,330 per hectare (highest) which was accounted from the fertilizer treatment 33% RDF alone (T_4) and 66% RDF + 5.0% foliar spray (T_{10}) respectively. The control treatment 100% RDF (T_{13}) accounted with Rs. 5, 08,090 per hectare of gross return.

Net return

The particular details of net return are tabulated in the table 3 and revealed net return ranged from Rs. 2,15,929.93 per hectare (lowest) to Rs. 4,70,459.86 per hectare (highest) which was accounted from the fertilizer treatment 33% RDF alone (T_4) and 66% RDF + 5.0% foliar spray (T_{10}) respectively.

The control treatment 100% RDF (T_{13}) accounted with Rs. 4, 23,211 per hectare of net return.

Table.1 Effect of different concentration of RDF and WSF on growth parameters of cauliflower

Treatments	Plant height (cm)		Number of leaves		Length (cm)		Breadth (cm)		Number of days to harvest
	45 DAP	Final stage	45 DAP	Final stage	45 DAP	Final stage	45 DAP	Final stage	
T_1: 33% RDF + 2.5% Foliar spray	42.44	49.11	13.33	14.78	38.78	40.89	18.44	19.56	73.67
T_2: 33% RDF + 5.0% Foliar spray	41.89	48.89	13.89	15.33	40.67	42.78	18.55	18.89	72.33
T_3: 33% RDF + 7.5% Foliar spray	43.33	51.67	14.11	15.56	43.33	45.11	20.44	20.67	72.67
T_4: 33% RDF alone	42.89	48.67	14.78	16.33	42.44	44.89	20.22	20.78	76.67
T_5: 50% RDF + 2.5% Foliar spray	45.55	54.22	13.89	16.33	48.56	50.89	20.78	21.78	72.00
T_6: 50% RDF + 5.0% Foliar spray	44.55	54.33	13.56	16.78	44.89	45.78	21.00	20.67	71.67
T_7: 50% RDF + 7.5% Foliar spray	47.55	51.22	13.67	16.22	43.56	43.44	20.00	21.22	70.00
T_8: 50% RDF alone	48.44	53.78	13.78	15.89	48.33	49.78	21.89	23.11	70.67
T_9: 66% RDF + 2.5% Foliar spray	47.22	57.33	13.89	17.56	49.67	50.11	22.11	23.33	69.33
T_{10}: 66% RDF + 5.0% Foliar spray	48.89	60.00	14.11	18.22	49.89	53.33	21.44	23.89	65.33
T_{11}: 66% RDF + 7.5% Foliar spray	52.22	55.22	14.22	16.22	48.11	48.44	21.78	22.22	67.33
T_{12}: 66% RDF alone	49.33	54.11	15.44	16.56	47.33	48.56	22.33	23.12	68.00
T_{13}: 100% RDF alone	49.67	51.78	15.41	16.52	46.22	47.44	20.78	21.67	72.33
Mean	**46.46**	**53.10**	**13.86**	**15.93**	**45.52**	**47.03**	**20.75**	**21.61**	**70.92**
SE m ±	**2.05**	**1.72**	**0.55**	**0.75**	**1.69**	**1.67**	**1.18**	**1.20**	**1.30**
CD @ 5%	**5.99**	**5.02**	**1.61**	**2.29**	**4.93**	**4.88**	**3.45**	**3.50**	**3.81**
CV%	**7.70**	**5.60**	**6.70**	**8.00**	**6.40**	**6.20**	**9.90**	**9.60**	**3.20**

RDF: Recommended doses of fertilizer WSF: Water soluble fertilizers DAT= Days after transplanting

Table.2 Effect of different concentration of RDF and WSF on yield parameters of cauliflower

Treatments	Curd diameter (cm)	Fresh weight of cauliflower (kg)	Average weight of curd (kg)	Curd yield/ plot (kg)	Total curd yield (t/ha)	Marketable curd yield (t/ha)
T_1: 33% RDF + 2.5% Foliar spray	13.44	0.88	0.57	20.85	31.02	29.28
T_2: 33% RDF + 5.0% Foliar spray	13.88	0.84	0.62	22.53	33.52	32.10
T_3: 33% RDF + 7.5% Foliar spray	13.44	0.86	0.59	23.39	34.80	32.38
T_4: 33% RDF alone	14.11	0.74	0.44	17.77	26.44	24.23
T_5: 50% RDF + 2.5% Foliar spray	13.88	0.89	0.63	23.44	34.88	32.57
T_6: 50% RDF + 5.0% Foliar spray	14.55	0.88	0.65	24.15	35.93	33.36
T_7: 50% RDF + 7.5% Foliar spray	14.22	0.93	0.77	28.67	42.66	40.84
T_8: 50% RDF alone	14.66	0.84	0.64	23.33	34.72	34.03
T_9: 66% RDF + 2.5% Foliar spray	15.88	1.21	0.86	32.69	48.64	47.07
T_{10}: 66% RDF + 5.0% Foliar spray	17.11	1.29	0.92	33.62	50.03	48.68
T_{11}: 66% RDF + 7.5% Foliar spray	14.88	1.15	0.82	30.13	44.83	43.01
T_{12}: 66% RDF alone	16.11	1.05	0.84	31.70	47.17	45.92
T_{13}: 100% RDF alone	14.88	1.17	0.83	31.04	46.19	44.52
Mean	**14.70**	**0.98**	**0.71**	**26.44**	**39.22**	**37.51**
SE m ±	**0.53**	**0.05**	**0.04**	**1.42**	**1.92**	**1.34**
CD (5%)	**1.55**	**0.13**	**0.80**	**4.15**	**5.59**	**2.76**
CV %	**6.30**	**8.10**	**10.10**	**9.30**	**8.50**	**4.40**

RDF: Recommended doses of fertilizer WSF: Water soluble fertilizers DAT= Days after transplanting

Table.3 Effect of different concentration of RDF and WSF on economic of cauliflower production

Treatments	Total curd yield (t/ha)	Cost of Cultivation (Rs. /ha)	Gross return (Rs. /ha)	Net return (Rs. /ha)	B:C ratio
T_1: 33% RDF + 2.5% Foliar spray	31.02	74,935.07	3,41,220	2,66,284.93	3.55
T_2: 33% RDF + 5.0% Foliar spray	33.52	74,960.07	3,68,720	2,93,759.93	3.91
T_3: 33% RDF + 7.5% Foliar spray	34.80	74,985.07	3,82,800	3,07,814.93	4.09
T_4: 33% RDF alone	26.44	74,910.07	2,90,840	2,15,929.93	2.88
T_5: 50% RDF + 2.5% Foliar spray	34.88	77,464.50	3,83,680	3,06,215.50	3.95
T_6: 50% RDF + 5.0% Foliar spray	35.93	77,489.50	3,95,230	3,17,740.50	4.10
T_7: 50% RDF + 7.5% Foliar spray	42.66	77,514.50	4,69,260	3,91,745.50	5.05
T_8: 50% RDF alone	34.72	77,439.50	3,81,920	3,04,480.50	3.93
T_9: 66% RDF + 2.5% Foliar spray	48.64	79,845.14	5,35,040	4,55,194.86	5.70
T_{10}: 66% RDF + 5.0% Foliar spray	50.03	79,870.14	5,50,330	4,70,459.86	5.89
T_{11}: 66% RDF + 7.5% Foliar spray	44.83	79,895.14	4,93,130	4,13,234.86	5.17
T_{12}: 66% RDF alone	47.17	79,820.14	5,18,870	4,39,049.86	5.50
T_{13}: 100% RDF alone	46.19	84,879	5,08,090	4,23,211.00	4.98

One kg cauliflower cost = Rs.11

RDF: Recommended Dose of fertilizers WSF: Water soluble fertilizers DAT= Days after transplanting

Cost benefit ratio

The examination of these all charted economics of the experiment (Table 3) all in all revealed some of the beneficial points with regard to economic perspective. Among the fertilizer treatments 66% RDF + 5.0% foliar spray (T_{10}) resulted in highest net return with the amount up to Rs. 4,70,459.86 per hectare with highest cost benefit ratio 5.89. However, this was followed by T_9 (66% RDF+ 2.5% foliar spray) with sum of Rs. 4, 55,194.86 per hectare and cost benefit ratio 5.70, T_{12} (66% RDF alone) with 5.50. On contrary, the minimum net return with the sum of Rs. 2, 15,929.93 per hectare and cost benefit ratio 2.88 was found in treatment T_4 (33% RDF alone).

The statistical data on thirty nine plots of different treatment exhibit that there was significant difference observed for plant height, number of leaves, length and breadth of leaves at different periodical stages of growth and days to harvest.

Perusal of the data of table 1 exhibited tallest plant (60cm) at final day by the treatment comprising 66% of RDF and 5.0% foliar application (T_{10}). The plant height accentuated might be due to the decisive utilization of major nutrients from split dose (three times during the crop growth stage) of soil application (RDF) and through foliar application which leads to derogate the degree of fixation, immobilization, volatilization, leaching and make easily available to the plant which enhances the upfront effect of inorganic nitrogen, which is a constituent of protein and chlorophyll molecules. The number of leaves (18.22), the length (53.33 cm) and breadth (23.89 cm) were superior in the T_{10} as depicted in the table 1. These characters of leaf are imperious since they decide the capability of the leaf to save the curd by covering and also increase the photosynthetic efficiency. The additional greater number of leaves at this stage is due to the proximity of more nitrogenous compounds to the mount at the plant height and thus an increase in the number of leaves per plant. The augment in plant height and number of leaves may be due to the fact that photosynthate synthesis increases due to increased vegetative growth in terms of plant height and number of leaves. The present findings with respect to the days to harvest was seen best in T_{10} which was in line with the findings of Srivastava (1996) where he reported that curd initiation was delayed by 4-6 days with inadequate doses of nitrogen. The availability of nutrients particularly nitrogenous compounds which was given by split dose in the form of soil application and foliar application and thereby increases in growth of the plant which in turn resulted in more photosynthesis and completion of physiological maturity of the plants to initiate earlier flowering and maturity. The initiation and maturity of the curd lays in the fact that translocation of photosynthates in the form of curd.

The treatment T_{10} dominates in all aspect of yield as shown in the table 2, conceivable due to the greater availability of nutrients, soared absorption of nutrients and water resulting in more photosynthesis which in turn enhances the food accumulation in the plant part leading to bigger curd (17.11cm) which in turn effect on highest average weight (0.92 kg) of curd. The split dose of fertilizer mainly, foliar application accelerated and stimulated the physiological forms and functions of cell, tissue and whole plant resulted in increase the yield parameters of cauliflower.

The data pertaining to economics of cauliflower cultivation (Table 3) influenced by application of RDF along with water soluble fertilizer at unalike concentration on

different stage has shown positive impact than direct soil application. Among the treatments highest net income was in T_{10} treatment (Rs 4, 70,459.86) with highest B:C ratio 5.89 which was subsequently followed by T_9 (Rs. 4,55,194.86) with a B:C ratio of 5.70 and T_{12} (Rs. 4,39,049.86) with a B:C ratio 5.50. Whereas T_{13} (100% RDF) application gave Rs. 4, 23, 211 as net income and accounted with 4.98 B: C ratio. That explicitly indicates that 50-66 per cent fertilizers requirement of cauliflower crop could be meet out by foliar application of water soluble fertilizers which reduces the expense for the purchase of fertilizers and increase yield with acceptable cauliflower curd.

From the aforementioned results and discussion, it has been affirmed that the application of 66 per cent recommended dose of fertilizers through soil application and 5.0% percent foliar application was found significantly superior over rest of the treatments in respect to growth parameters, yield parameters, and financial return *viz.*, highest net return and recorded highest B: C ratio. Hence the foliar fertilization in cauliflower is an important farm practices for management for sustainable and successful crop production. This is a novel measure due to the effect on the entire crop production. Foliar feeding is a simple nutrient corrective technique used in vegetable crops during the growth cycle when soil application is ineffective and lets to hazards as expensive.

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